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GAMIFICATION TO IMPROVE SCRUM ADOPTION: A CASE STUDY AT POULTRY STARTUP IN INDONESIA

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ABSTRACT

Agile methodology offers software development flexibility to respond to changes quickly. Agile methods are better than traditional ones, especially in terms of reducing costs much more efficiently. One of the Agile approaches is Scrum which involves a small team to make a Sprint in the process. Agile and Scrum are not without gaps; there are challenges in adopting them. Among the challenges are poor communication, lack of team motivation, and lack of support from the senior development team. All of Scrum's adaptation challenges stem from the human factor running it. Applying the concept of gamification in Scrum can address these challenges. Gamification can enrich non-gaming processes by making them more enjoyable and increasing the productivity of the development team. This study focuses on investigating the Scrum team at the poultry startup that applies the Scrum approach to adapting to changes quickly. Jira application is used to manage scrum within the company. Jira Software has "Trophies for Jira Dashboard" application for gamification implementation on the development team. The application of gamification will make the development team feel happy, like they are running a game in a work environment with healthy and fun competition. By implementing gamification, development team experiences personal growth, more motivation at work, increased efficiency, and early issue resolution, leading to improved productivity and enhancing agile success rate. As a result of this research, gamification process impacts 69% of Agile success, indicating that the company will have benefit by applying gamification without significantly increasing its costs.

Keywords: Gamification, Agile, Scrum, Software Development, Poultry Industry, Startup.

1. INTRODUCTION

Agile can help companies respond to changes quickly. It offers high flexibility for changes to the software development process, even if these changes occur midway through the software development process. Compared to traditional approaches, the cost of Agile is more affordable in software development [1]. Agile can also improve software development by up to two times better and one-third less failure when compared to traditional approaches [2].

Agile requires the development team to develop software in rapid iterations. The most common approach in Agile is Scrum [3]. Scrum involves small teams that carry out a process called a sprint. Sprint operates according to Scrum artifacts. However, the created user stories are the baseline for Scrum artifacts. In the Scrum process, communication must be well executed [4]. The Scrum team must be committed to the goals that have been set and must support each other. Agile and Scrum offer advantages for a team in software development, such as improved product quality and customer satisfaction. However, its implementation still has many challenges, including human factors [5] [6]. Challenges that must be solved are improper communication [6], a lack of motivation from the software development team to apply Agile techniques in practice [6] [7], and a lack of support from senior developers in helping the Scrum process [8]. One of the solutions to overcome this is the gamification approach.

Gamification is a popular approach that can make the non-gaming process more enjoyable and increase the motivation of the team that implements it [9]. Technically, gamification adds gameplay and game design elements to a non-gaming process aimed at motivating and engaging the team to adopt new positive habits [10]. Gamification can allow a team to carry out problem-solving activities by rewarding those involved and aims to provide incentives without significantly increasing costs.

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In adopting Agile, the team needs a tool to	2. LITERATUR REVIEW	
simplify its management. The most used tool is Jira	2.1 Scrum	

simplify its management. The most used tool is Jira Software. Jira Software supports several Agile approaches, including Kanban, Scrum, and others. The features contained in Jira Software include Scrum boards, Roadmaps, Reports, and many other features needed in developing a project [11]. Jira Software also has applications to adopt gamification to Scrum processes, called the Trophies for Jira Dashboard.

The Trophies for Jira Dashboard will competition encourage healthy between development teams to increase productivity [12]. One of the application's features is the ability to determine the level of development of team members based on the points they get when running Scrum. The levels are "beginner" for true beginners and "legend" for the highest level. To earn points, the development team must perform Scrum activities, and if they take additional initiatives in Scrum activities, they will also receive extra points. In addition, there is a significant bonus point if they become Leader of the Day, Week, Month, etc. To implement Scrum, the company uses management tools, namely Jira Software. Then, the Trophies for Jira Dashboard tools will be used to apply gamification to the development team.

This study on gamification to improve Scrum adaptation was carried out at a poultry startup in Indonesia, Chickin PTE. LTD. Company has a team of developers who recently adopted Scrum. Since the company is relatively new to adopting Scrum, there is a need for process improvement. The development team tweaks the process by adapting the concept of gamification to improve Scrum's quality. Previous research has addressed several initiatives to improve software development process in the organization [9] [13] [14]. However limited research talks about gamification to improving scrum adaptation especially in software development at poultry industry. This research aims to understand the impact of gamification. In particular, the research question in this study is "Does the application of gamification have a positive impact on improving the adaptation of Scrum by the development team?". The researchers will elaborate on the analysis results of gamification's impact on the company. Expectations with the implementation of gamification will impact the development team's productivity in implementing scrum. So the company will benefit by applying gamification without significantly increasing its costs. This study will conclude with several conclusions, including work in the future.

Scrum is the most widely used approach [3]. With the Scrum approach, software developers gain the ability to develop products with a higher complexity [15]. Transparency in software development will also support the team in achieving predetermined targets [16]. Besides transparency, Scrum also allows organizations to adapt and conduct inspections.

The product owner, the Scrum Master, and the development team are the three roles in the Scrum game [4]. The product owner creates a product backlog that the development team will execute. The product backlog must be made with a complete and clear description for the development team so that the team can conduct the development process accurately. Scrum master is obligated to ensure that the development team can complete the work on each sprint that has been set. Furthermore, the development team does the technical work in making the product.

A well-implemented Scrum will be able to produce high-quality products on time. Therefore, the team's capabilities are the major contributor to Scrum's success. If any works are late on one sprint, it will impact the next sprint. The researchers expect motivation and adaptability to Scrum will increase with gamification.

2.2 Gamification

Gamification is the addition of game elements and design to a non-gaming process that aims to motivate and engage the development team to adopt new positive habits [10]. This is substantial because the software development process involves intensive brain performance and collaboration, which consists of repetitive and continuous activities. Therefore, the gamification process is a solution for making work more enjoyable and appealing [17].

The gamification approach aims to solve software development problems with good motivation so that companies obtain benefits without having to incur high costs. Although the gamification process works like a game, it does not turn everything into a game. Gamification only uses elements from the game in the existing process [18]. Gamification applied internally to the company can increase the productivity and motivation of the development team, while externally can improve customer relationships [19].

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The implementation of gamification in the software development process can be implemented through prize distribution to the development team so that if the number of tasks completed by the development team increases, the chances of winning prizes increase [20]. Another study proposed integrating the gamification approach with the Scrum dashboard, where the development team will receive points and badges for completing their work and mutual collaboration with other development teams [21].

2.3 Agile Success

The effectiveness of the work and enthusiasm of the development team is the key to the success of software development [21]. Several problems often occur in software development, including poor software quality, long development times, and costs that exceed the budget. There are five solutions in Agile that can solve these problems, including [19]:

- The development team learns new things and has healthy competition with each other. This will motivate a person to continue to grow and continue to learn. 37% user retention occurred in companies in the United States after implementing the solution in the leadership academy training program.
- 2) Increase cooperation and motivation between the development team. A developer will be motivated to work better if they understand the goals and desire to provide the best. 69% of employees will do an excellent job if there is cooperation and motivation from co-workers.
- 3) Work on projects in an efficient time. Gamification can provide time in each stage that is passed. A company in the United States can save 50% of the time required to certify with this method.
- Mitigation of errors in software development. Gamification in software development can improve repairs by 75% of errors in the development process, allowing developers to focus on core activities.
- 5) Dividing the software development process into small parts and individually working on the specified parts. 84% of companies have increased team productivity successfully by implementing Agile methods.

3. METHODOLOGY

This study aims to make the Scrum process more enjoyable and exciting for software developers

using gamification. Figure 2 depicts a research flow that begins with identifying problems, then applying the gamification method to the internal development team, creating a questionnaire, taking data from the questionnaire on the results of gamification, and conducting a series of analyzes starting from validity tests, reliability tests, normality tests, and regression analysis. Finally, based on the results of the analysis, a conclusion is drawn.



Figure 1: Research Flow

3.1 Gamification

Gamification is designed using a 6D framework that best fits the rules of the formal process of gamification design [22]. The 6D framework is the most used and complete framework, consisting of mutual collaboration between development teams [21].

3.1.1 Define objective

The main objective of this study is to increase the adoption of Agile, especially the Scrum approach. Agile is said to be successful if it reaches the five aspects described in the literature review section. Concrete goals have been determined to measure the success of the application of gamification.

3.1.2 Delineate target behaviors and metrics

Currently, the preparation of tasks in each sprint is mostly done by a product manager during backlog grooming. Scrum will eventually allow a



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team to create tasks for each sprint on its own. Scrum	Jira Apps. The tools used here are Trophies for J	lira
adaptation shapes positive habits within the team so	Dashboard, which has received a full star avera	age

adaptation shapes positive habits within the team so that in the end, the whole team will work full of initiative. The metrics measured for the software

development team are the total story points successfully worked on. The velocity of a developer will appear following the ability and level of a developer. With gamification, the development team can increase the class to become a senior faster. In the end, one development team will be able to complete the work with higher accuracy and scalability.

3.1.3 Describe your players

The players in the implementation of gamification in Scrum are the developer team at Chickin PTE. LTD. The development team consists of front-end engineers, back-end engineers, mobile engineers, uiux designers, and quality assurance.

3.1.4 Devise activity cycles

When the software development team performs daily activities on Jira, they will receive positive and constructive feedback. The feedback is in the form of points they receive when they do something. This feedback can motivate them to take more initiative than before. The researchers set a series of feedback for the software development team. The feedback includes getting points when doing activities on the Scrum board; achieving achievements and awards with certain criteria; increasing the leader board position if the members get a certain number of points; Increasing the level if the members reach a certain number of points.

3.1.5 Don't forget the fun

The social component can contribute to a pleasant work environment. The team must be able to visualize each other's achievements to foster healthy and exciting competition. By getting an award, the development team will feel happy and unaware that they are involved in a competition.

An achievement will increase the sense of belonging to the work. The visualization here is obtained from the points earned by the developer in the form of virtual achievements and virtual awards. Gamification will make the development team feel like they are running a game in a work environment with healthy and fun competition.

3.1.6 Deploy the appropriate tools

Jira is one of the tools widely used by development teams worldwide, so Jira has a vast support community. In applying gamification, the researcher selected several gamification plugins in Jira Apps. The tools used here are Trophies for Jira Dashboard, which has received a full star average rating from 46 reviews.

After the implementation of the gamification process in the software development team, the researchers conduct further research using a questionnaire with a Likert scale to obtain primary data. The questionnaire contains 19 questions consisting of 6 gamification questions and 13 Agile success questions. Following data collection, the researchers carried out validity, reliability, normality, and regression tests.

3.2 Validity Test

The research instrument must be a measuring instrument that is acceptable or standardized that can pass the validity and reliability tests. The validity test used The Pearson Product Moment formula [23] as follows:

$$rhitung = \frac{n(\Sigma XY) - (\Sigma X).(\Sigma Y)}{\sqrt{\{n.\Sigma X^2 - (\Sigma X)^2\} \{n.\Sigma Y^2 - (\Sigma Y)^2\}}}$$
(1)

Information:

n

- R_{count} : correlation coefficient
- ΣXi : total item score
- ΣYi : total item score count
 - : number of respondents/subjects

 R_{table} is a table with a numerical model that is most used to test various possible results of the validity of the research instrument. The test used is a validity test, which is a critical aspect of the research instrument.

In the SPSS calculation, it is obtained that the r_{table} values for N=20 are 0.514 (for the 5% sig. test) and 0.641 (for the 1% sig. test).

The validity test is known by calculating SPSS and comparing the values of r_{table} and r_{count} on each item of the compiled questionnaire. The decisions made are as follows:

- 1) If the value of $r_{table} > r_{count}$, then the item is declared valid
- 2) If the value of $r_{table} < r_{count}$, then the item is declared invalid

To ensure its validity, it is important to test each item of questions. The results of the r_{count} are compared with the r_{table} . If $r_{table} < r_{count}$, then it is valid. The r_{table} value was obtained from the SPSS analysis of the Pearson Correlation coefficient [23].

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	Table I	: Validity Test	Мо	: Mode
	Correlation Index	Interpretation	Ő	: Standard deviation
	0,800 - 1,000	Very high		
	0,600 - 0,799	High	Or it could	l be done by calculating the
	0,400 - 0,599	Moderate	results of the SPSS ar	nalysis as in the equation above.

< 0,20 Very low/Not valid Deleting any invalid items is critical to reaching the overall validity until the instrument is suitable for usage.

Low

3.3 Reliability Test

0,200 - 0,399

After ensuring the validity of all items, the next step is to conduct a reliability test. A reliability test determines whether the measuring instrument continues to produce a stable or fixed value even at different times, indicating that it is reliable and consistent. The instrument is reliable if it has a minimum Cronbach Alpha value of 0.60. A good measurement instrument has a reliability coefficient of more than or equal to 0.70 [23]. To test the validity and reliability, this study used the SPSS 20 program.

Table 2 : Reliability Test

Guilford Table			
Cronbach Value Interpretation			
0,90 < R < 1,00 Very high			
0,71-0,89 High			
0,41 - 0,70	Moderate		
0,21 – 0,40 Low			
< 0,20	Very low/Not reliable		

3.4 Normality Test

A normality test is a test to measure a group of data that has a normal distribution so that it can be used in parametric statistics and can be analyzed further. Various tests can be carried out depending on the number of subjects and the data type.

The normality test aims to determine whether the confounding or residual variables have a normal distribution in the regression model. In this case, the researchers used the Skewness and Kurtosis Tests (a measure of the skewness of the data). Skewness shows the slope/ of the normality graph while Kurtosis indicates the sharpness of the normality graph [24].

The normality of the data can be determined using the following formulas:

$$Z Skewness = \frac{\mu - Mo}{\sigma} \operatorname{atau} \frac{Skewness}{Std.Error of Skewness} \quad (2)$$

Z Skewness : Slope coefficient

$$\mu$$
 : Calculated = value

results of the SPSS analysis as in the equation above. $Z Kurtosis = \frac{\mu - Mo}{\sigma} \operatorname{atau} \frac{Kurtosis}{Std.Error of Kurtosis}$ (3)Z Kurtosis : Slope coefficient : Calculated = value μ Mo : Mode Q : Standard deviation

Or it could be done by calculating the results of the SPSS analysis as in the equation above

3.5 Regression

The questionnaire results were analyzed using regression analysis to see if gamification affects Agile success. Regression analysis is a study to determine the effect of one independent variable on one dependent variable [25].

The purpose of regression analysis is (a) to estimate the average and value of the dependent variable based on the value of the independent variable; (b) to test the dependency characteristic hypothesis; (c) to predict the average value of the independent variable based on the value of the independent variable outside the range of the sample.

The feasibility of the linear regression model is based on the following:

- The regression model is said to be feasible if the 1) significance number on the ANOVA is <0.05
- 2) The predictor used as the independent variable must be feasible, known by the value of Standard Error of Estimate < Standard Deviation (Table of Descriptive Statistics and Model Summary)
- 3) The regression coefficient must be significant if $T_{count} > T_{table}$ (critical value is seen in Coefficient table)
- 4) The alignment of the regression model can be explained by using the value of r^2 . Therefore, the greater the value of r^2 , the better the model.
- There is a linear relationship between the 5) independent variable (X) and the dependent variable (Y)
- 6) Data must be normally distributed
- 7) Interval or ratio scale data

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The regression Coe	ficient Equation can be team with the highest	score gets a prize from the
calculated by looking	t the output table company.	

 $Y = a + bX \tag{4}$

Y: Scrum

Coefficients.

- a: Unstandardized Coefficient constant number (B)
- b: The number of regression coefficients (B). If the number is positive (+), it means that for every addition of 1 gamification, it will increase Scrum by B. Conversely, if the number is negative (-), then there is a decrease in the Scrum level.
- x: gamification

4. **RESULTS**

4.1 Gamification

The gamification process on the Chickin PTE. LTD. development team was carried out for one quarter. The team previously had no experience developing Agile methodology technology with the Scrum approach. Jira Software's tools assist the Scrum approach to the development team to make Sprint easy. Jira Software has an application that helps gamification, namely Trophies for Jira Dashboard. Figure 2 depicts an early screenshot taken before the development team began gamification.

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C Mare Worker	-				eader of the week	0 total
One Day Worder				-10	auder of the day	0 total
O Cree Week Wunder					anue Create	Q total

Figure 2: Before Gamification Started

During gamification, the development team competes with each other to get first place. In every written documentation, the development team will get points according to the documentation category. If the team gets the most points cumulatively in a certain period, then there will be extra points for the developer. The number of extra points earned follows the length of the specified period. Then at the end of the gamification period, the development 4.2 Validity test

Validity is a sign of a research instrument against a concept that is appropriate and feasible to use. The validity test is known by calculating SPSS and comparing the values of r_{table} and r_{count} on each item of the questionnaire that is compiled. The decisions made are:

- 1) If the value of $r_{table} > r_{count}$, then the item is declared valid
- 2) If the value of $r_{table} < r_{count}$, then the item is declared invalid

The SPSS calculation shows that the r_{count} values are 0.514 and 0.641. Meanwhile, the value of r_{table} can be seen in the SPSS calculation table. Below is the r_{table} for items that have been declared valid.

No	Variable	Rtabel Value	Information
1	Gamification	0.701	Valid item
2	Gamification	0.659	Valid item
3	Gamification	0.655	Valid item
4	Gamification	0.869	Valid item
5	Gamification	0.802	Valid item
6	Gamification	0.695	Valid item
7	Scrum	0.638	Valid item
8	Scrum	0.788	Valid item
9	Scrum	0.812	Valid item
10	Scrum	0.547	Valid item
11	Scrum	0.613	Valid item
12	Scrum	0.560	Valid item
13	Scrum	0.555	Valid item
14	Scrum	0.586	Valid item
15	Scrum	0616	Valid item
16	Scrum	0.689	Valid item
17	Scrum	0.754	Valid item
18	Scrum	0.533	Valid item
19	Scrum	0.560	Valid item

Table 3: Validity Test

Therefore, all 19 items were valid, with details of 6 items of gamification variables, and 13 items of Scrum variables.

4.3 Reliability test

The reliability test was conducted to measure the balance and determination of the research respondents when giving statements from the variable model. The conclusion is based on the value of Cronbach's Alpha based on reliability testing on SPSS:

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Table 1 : Paliability test	graph is said to be	normal if the data distribution

Table 4 . Kellability lest			
Reliability Statistics			
Cronbach's Alpha N of Items			
904	25		

Because the value is 0.904, the instrument is classified as reliable.

4.4 Normality test

A normality test is a test to measure a group of data that has a normal distribution so that it can be used in parametric statistics and can be analyzed further. Various kinds of tests can be carried out depending on the number of subjects and the type of data.

4.4.1 Skewness and Kurtosis Analysis

A normality test with Skewness and Kurtosis can be determined by calculating the value of Zskewness and Zkurtosis. The Zskewness value can be calculated from the Skewness/SE Skewness value. Meanwhile, the Zkurtosis value can be calculated from the Kurtosis/SEKurtosis value.

Tuble 5. Normally lesi				
	Statistics			
Gamification Scrur				
Ν	15	15		
	11	11		
Mean	24.80	56.87		
Median	25.00.00	59.00.00		
Std. Deviation	3.913	5.842		
Variance	15.314	34.124		
Skewness	289	497		
Std. Error of	.580	.580		
Skewness				
Kurtosis	-1.365	-1.087		
Std. Error of	1.121	1.121		
Kurtosis				
Range	11	18		

Table 5: Normality test

Calculation of normality in gamification:

Zskewness =
$$\frac{-0,289}{0,580}$$
 = - 0.498
ZKurtosis = $\frac{-1,365}{1,121}$ = -1.217

Calculation of normality in Scrum:

Zskewness
$$\frac{-0,497}{0,580} = -0.856$$

ZKurtosis $= \frac{-1,087}{1,121} = -0.969$

Because all the values of Zskewness and Zkurtosis Variables are between -1.96 and +1.96, then all data are normal.

4.4.2 Histogram chart analysis

The normality test can also be analyzed graphically as a histogram graph. The histogram

graph is said to be normal if the data distribution is bell-shaped and not skewed to the left and right. It can be seen in Figure 1 and Figure 2 that the histogram graph forms a bell line, indicating that the data is normal.



Figure 3: Gamification histogram



Figure 4: Scrum histogram

4.5 Regression analysis

Regression analysis is used to see the effect of the independent variable on the dependent variable.

4.5.1 Based on the value of ANOVA

The magnitude of the probability or significance number is used for the feasibility test.

Table 6 : ANOVA Table

Model	F	Sig.
Regression	29,473	0,000

Because the probability value in the ANOVA table is 0.000 < 0.05, this regression model is feasible to be used in predicting gamification in improving Scrum.





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Based on the regression coefficient

If the value of sig. <0.05, then there is an influence between the independent variable on the dependent variable. The value of sig F change = 0.000 > 0.05, indicating that there is an effect.

Table 7 : Regression value of sig

Coefficients					
Mod B Std. T Sig					Sig.
el			Error		
1	Constant	26.02	5.476	4.530	0.001
		9			
	Gamification	1.243	0.229	5.429	0.000

4.5.3 Based on the comparison of the value of Tcount and Ttable

Here is the result of T_{count} and T_{table} .

 $T_{count} = 5.429$

 $T_{table} = 2.160 (df = N-2)$

The value of T_{count} is not between $=T_{table}$ and - T_{table}, indicating that there is an effect.

Meanwhile, the regression equation is as follows:

- Y = a + bX
- a: Constant number of unstandardized Coefficients B. This calculation shows the number 26.029. This number means that if there is no gamification (X), then the consistent value of Scrum is 26,029.
- b: Number of regression coefficients. Its value is 1.243. This number means that every 1% addition of gamification (X) will increase Scrum by 1.243.

Therefore, the equation is as follows, Y =26.029 + 1.243X

4.5.4 Based on the sig

Because the probability value in the table coefficient is 0.000 < 0.05, this regression model is feasible to use in predicting gamification in improving Scrum.

Based on the coefficient value of R 4.5.5

Validity is a sign of a research instrument against a concept that is appropriate and feasible to use. The regression value of R is calculated to determine how much influence the gamification variable (X) has on the scrum adoption variable (Y). The following is a regression table for the value of R in table 8.

Table 8 :	Regression	value of R	

			-	
Model Summary				
Model	R ²	df1	df2	Sig
1	0.694	1	13	0.000
Gamification				

The R value of 0.694 means that the independent variable (gamification) affects the dependent variable (scrum adoption) by 69.4%. Then, 30.6% of gamification is influenced by other variables that are not examined.

The result of the analysis indicates that gamification has a significant effect on Scrum adaptation. The success of Agile deployments can express a successful Scrum adoption. The study shows that 69% of gamification impacts Agile success.

5. DISCUSSION

The results of the analysis indicate that gamification has a significant effect on Scrum adaptation. The success of Agile deployments can express a successful Scrum adoption. This study shows that 69% of gamification impacts Agile success. Gamification impacts all the factors of Agile success simultaneously, including personal growth, motivation, time, error mitigation, and productivity.

Personal growth factors will influence development team members to learn new things and develop skills. It was demonstrated that during the gamification process, the research board was more filled than before. The development teams compete with each other to get points from the research. Ultimately, the development team will perceive healthy competition.

Motivation factors make team members motivated to pursue success. The development team became motivated to become the leaderboard on Trophies for Jira Dashboard. They also compete to get extra points if they become on the leaderboard for a certain period. In addition, the gamification process makes the development team more cooperative among colleagues because if there are members who do not update tickets on Jira, they will become blockers for other members. Aiming for the same goal, every development team member wants to give the best for the company.

The time factor in gamification affects the timeliness of doing work. Gamification helps the Scrum process on the development team finish on time or sooner before the sprint ends. There is a "sprinter" achievement for the development team that passes the Scrum process with the most points.



The working time is more congested and completed on time, resulting in more effective work completion.

The error mitigation factor allows developers to write clean code. This was proven during gamification; the developer carried out more detailed documentation. Error mitigation is also supported by implementing standard unit tests on every code the development team writes. Therefore, if an error occurs, the QA team can find the root of the problem faster. Then with the initiative to earn points, developers are also more active in finding and correcting application errors.

Finally, on the productivity factor, gamification can increase team productivity. The software development process is divided into more detailed sections. As a result, the development team completed many work initiatives without receiving any orders. The team spirit grows as they compete for each other's leaderboard positions. Overall, team productivity increased significantly during gamification implementation.

Gamification can be applied to any development team implementing scrum or other agile methods. The positive impact of gamification for companies is that it can increase team productivity without spending a lot of money. Simply by implementing gamification, the development team will be motivated to compete for the first rank. That way, the development team will be able to compete healthily and positively. Figure 5 is the result of the development team leaderboard.

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Figure 5: Leaderboard gamification

All previous studies that discussed the impact of gamification on software development showed positive things [9] [13] [14] [17] [20] [21]. Previous research about gamification is attached to table 9. The result is in line with this research, there was found that implementing gamification in the development team can improve scrum adaptation. Gamification can apply to groups that are about to or have just started implementing Scrum. Team productivity will increase according to the team's

maturity level in implementing Scrum. So that each team will certainly get different results in the level of productivity obtained.

Table 9 Research Gamification				
Research	Impact	Prev. Research		
A gamification solution for improving Scrum adoption	Positive	[9]		
Relax, It's a Game: Utilising Gamification in Learning Agile Scrum Software Development	Positive	[13]		
Challenges of gamification in software process improvement	Positive	[14]		
Gamification in software engineering – A systematic mapping	Positive	[17]		
An Exploration of the Use of Gamification in Agile Software Development	Positive	[20]		
A Scrumban integrated gamification approach to guide software process improvement: a Turkish case study	Positive	[21]		

6. CONCLUSION

Scrum offers advantages for companies although not all companies can implement it properly. A good Scrum adaptation can provide success in implementing Agile. Gamification is one way to increase the success of Agile within the company. The implementation of gamification at the Chickin PTE. LTD. software development team has a positive impact on the success of Agile. The development team feels more personal growth, more motivated at work, more efficient working time, and early mitigation of error codes, resulting in increased productivity. These growths show that by applying gamification, the company will benefit without significantly increasing its costs.

Based on research questions "Does the application of gamification have a positive impact on improving the adaptation of Scrum by the development team?". The expectation from this study is that the company will benefit by implementing gamification. And this is proven on this reseach by the implementation of gamification scrum adoption will increase, allowing the development team to achieve success and the

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company's business objective w	with Agile	[7]	T. DeMarco and T. R. Lister, Peopleware:
implementations. This study shows t	that 69% of		productive projects and teams, Third edition.
gamification impacts Agile success.	Gamification		Upper Saddle River, NJ: Addison-Wesley,
impacts all the factors of Ag	ile success		2013.
simultaneously, including persona	al growth,	[8]	K. Dikert, M. Paasivaara, and C. Lassenius,
motivation, time, error mitigation, and	productivity.		"Challenges and success factors for large-
			scale agile transformations: A systematic

At the end this study is limited only to the implementation of gamification in Chickin PTE. LTD. startup, which recently implemented Scrum. This study is limited to the use of Scrum in companies. Gamification is also implemented for a development team with experience in scrum adoption but will get different productivity results. In future works, it can be applied to companies implementing Kanban, Scrum of Scrum, Agile Spotify, or other Agile approaches.

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